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I, JONNE YABSLEY, TEAM LEADER EXAMINATION SUPPORT AND SALES hereby certify that annexed is a true copy of the Provisional specification in connection with Application No. 2002953417 for a patent by GERARD INDUSTRIES PTY LTD as filed on 18 December 2002.

WITNESS my hand this
Fifth day of January 2004

JONNE YABSLEY
TEAM LEADER EXAMINATION
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GERARD INDUSTRIES PTY LTD

AUSTRALIA

PATENTS ACT 1990

PROVISIONAL SPECIFICATION FOR AN INVENTION ENTITLED:-

"ALARM ASSEMBLY SUITED TO SMOKE ALARMS"

This invention is described in the following statement:-

FIELD OF THE INVENTION

The present invention relates to alarm and/or detector assemblies such as smoke alarms and in particular to smoke alarms having a battery back up to a mains electricity power supply.

5

BACKGROUND TO THE INVENTION

Smoke alarms and carbon monoxide alarms are typically mounted at various locations around a house or other buildings to detect dangerous air quality conditions that may arise as a result of fire and give an alarm signal. Such alarm units must be highly reliable so that the alarm can detect conditions invisible to the human senses when the occupants of the building are asleep. Domestic smoke alarms in the past have typically been powered by a battery that gave about one year of normal operation. No connection to the mains circuit was made. Recent changes to regulations in many countries have mandated the use of fixed wiring to provide mains power combined with battery back up for loss of mains power in smoke alarms.

Most mains power smoke alarms found in Australia, having battery back up systems, use a plug in connector with a small flex that requires a further termination box for connection usually fixed above the ceiling. This arrangement is not desirable for the installer as he/she is required to fix the terminal connection means to a fixing point as is required by the wiring rules, this usually necessitates entering the roof cavity, plus the extra cost to purchase the junction box.

The small connector plug and separate terminal housing referred to above is used in many countries around the world. The problem with this method of termination is the requirement for a separate terminal connection means plus the plug can get knocked out of its connection when insulation batts or the like are pulled over the smoke alarm. The cable length may also not reach a fixing point for the terminal box. In this case the electrician has to make a fixing point closer to the smoke alarm.

Other smoke alarms in the market have integrated the terminals within their mounting plates, but with the addition of terminals and the conventional layout of components such as the battery position the alarm becomes large and bulky making it less commercially acceptable. Batteries also require replacement annually, hence a simple means is required to allow the battery replacement. The alarm must also prevent the user from connection to the mains circuit without the battery fitted. Many designs for battery removal are available on the market. Most have complicated door mechanism that hide the battery some have complicated switching that allow the user to keep the mains connection but isolate the sense electronics when the battery door is open. In most cases the battery is hidden and is difficult for impaired persons to remove or understand how removal is achieved.

It is an object of the invention to overcome at least some of the problems outlined above.

BRIEF DESCRIPTION OF THE INVENTION

Broadly, according to a first aspect of the invention there is provided a detector assembly comprising:

a ceiling mountable socket;

a detector module having a battery support portion, the module receivable by the socket;

a connection means for mechanically and electrically connecting the detector module to the socket, the connection means comprising at least two cooperable pairs of conductors, in use the conductor pairs transmitting power from the socket to the detector module, the pairs of conductors mutually shaped and constructed so as to provide sufficient mechanical holding strength to support the module against gravity; and

a lockout means arranged to prevent operation of the connection means when no battery is installed within the detector module.

Preferably each of the cooperable pairs of conductors comprises a stud conductor terminal and a forked conductor, the forked conductor having two spaced apart

resilient prongs, wherein, in use the prongs are biased towards each other and are disposed on opposite sides of the stud, thereby gripping the stud.

5 Preferably the forked conductors are constructed so that the prong legs will make contact with the stud even with differing height tolerances due to manufacturing tolerance as the prongs are slotted in shape.

Preferably the forked conductors are constructed from phosphor bronze or similar resilient conductive material.

10

Broadly, according to a second aspect of the invention there is provided a detector assembly comprising:

a ceiling mountable socket;

15 a detector module having a battery support portion, the module receivable by the socket;

a connection means for mechanically connecting the detector module to the socket;

a connection means for electrically connecting the detector module to the socket; and

20 a lockout means having a shutter mounted to the socket,

wherein the lockout means prevents operation of at least the mechanical connection means when no battery is installed within the detector module.

25 Preferably the connection means for mechanically connecting the detector module to the socket and the connection means for electrically connecting the detector module to the socket are a single connection means.

30 Preferably the battery support portion is arranged and constructed to hold a battery in a vertical orientation such that it protrudes upwards to engage the shutter mounted to the socket.

Preferably the socket comprises a first body adapted for mounting in an aperture through a ceiling, the body defining an opening for receiving a substantial portion of a vertically orientated battery.

- 5 Preferably the connection means comprises at least two cooperable pairs of conductors, in use the conductor pairs transmitting power from the socket to the detector module.

- 10 Preferably the gripping of the studs by the conductors provides sufficient mechanical connection between the socket and the detector module to hold the detector module in place against gravity when the socket is installed in a ceiling.

- 15 Preferably the shutter is shaped and positioned such that it mechanically prevents connection between the conductors of at least one of the pairs of conductors unless the shutter is held displaced by the presence of a battery in the battery support portion.

Broadly, according to a third aspect of the invention there is provided a detector assembly comprising:

- 20 a ceiling mountable socket;
a detector module receivable by the socket; and
a connection means for mechanically and electrically connecting the detector module to the socket, characterised in that the connection means is inoperable unless a protruding battery is mounted to the module. Preferably the protruding battery is
- 25 engagable with a lockout means comprising a shutter mounted to the socket, the shutter rendering the connection means inoperable unless the battery is mounted to the module. With this arrangement the battery is semi exposed when the alarm unit is separated from the socket hence easy to see and remove.
- 30 Preferably the protruding battery is vertically orientated. Vertical orientation facilitates the required protrusion for interaction with the lockout means and allows

a more compact and reduced diameter detector module.

A specific embodiment of the invention will now be described in some further detail with reference to and as illustrated in the accompanying Figures. This embodiment is
5 illustrative, and is not meant to be restrictive of the scope of the invention.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT OF THE INVENTION

A preferred embodiment of the invention is illustrated in the accompanying
10 representations in which:

Figure 1 is a perspective view of an assembled detector assembly according to the invention.

Figure 2 is a top perspective view of a ceiling mountable socket component of the detector assembly of Figure 1.

15 Figure 3 is a similar view to that of Figure 2 but with the hinged cover in an open position.

Figure 4 shows the assembly of Figure 10 in a disassembled perspective view.

Figure 5 shows an underside view of the ceiling mountable socket shown in Figures 2 and 3.

20 Figure 6 shows an exploded top perspective view of the socket of Figure 5.

Figure 7 shows an underside perspective exploded view of the socket of Figure 5.

Figure 8 shows a perspective view of a component of the detector module component shown in Figure 9.

25 Figure 10 and 11 show an underside perspective view of the socket of Figure 5 in respective locked out and unlocked out conditions.

Figure 12 shows a cutaway cross sectional perspective view of the detector assembly shown in Figure 4.

Figure 13 shows a perspective view of components of the detector assembly as shown in Figure 12.

30

Referring to Figure 1, a low profile smoke detector assembly 10 is shown. The detector assembly 10 comprises two main components, a ceiling mountable socket 20 and a plug in detector module 70.

- 5 Referring to Figures 2 and 3, it can be seen that the socket 20 is mountable in a ceiling through a circular cut out using mounting arms 25. Mounting arms 25 rotate about mounting screws 26. A cover 35 is mounted about a hinge 36 to double insulate the terminal area in the roof cavity. The top cover 35 includes a break out area 37 for up to three additional cables. Upright portion 39 is provided to enable secure
10 connection of the power supply cable using a cable tie 12 as is shown in Figure 12.

Four terminals A E N I (Active, Earth, Neutral, Interconnect) in line makes wiring easy. The diameter of the terminals 31, 32, 33 and 34 is preferably five millimeters. Connection of wiring to these terminals is made easy by the fact that the top cover 35
15 can flip open 180 degrees giving clear access to the terminal area as is shown in Figure 3.

Referring to Figure 4, it can be seen that the detector module 70 has a battery support portion 75 that holds the battery 76 in a vertical orientation extending away from and
20 protruding from the body of the detector module 70. In other embodiments of the invention the battery may be mounted on its side with one side extending away from the body of the detector module.

A connection means for mechanically and electrically connecting the detector
25 module 70 to the socket 20 is provided. The connection means comprises at least two cooperable pairs of conductors, in use the conductor pairs transmitting power from the socket 20 to the detector module 70. The pairs of conductors are most clearly shown in Figures 12 and 13. They are mutually shaped and constructed so as to provide sufficient mechanical holding strength to support the module against
30 gravity.

More specifically, each of the cooperable pairs of conductors comprises a stud connector, such as the stud connector 41 shown in Figure 13, and a forked conductor, such as a conductor 91 shown in the same Figure. Forked conductor 91 has a pair of spaced apart resilient prongs 91' that are biased towards each other and are disposed on opposite sides of the stud 41 thereby gripping the stud 41.

The lockout means is arranged to prevent operation of the above described connection means when no battery is installed within the detector module 70. The lockout means includes a shutter 50 mounted to the socket 20 as shown in Figures 5, 10 and 11. Referring to Figure 10, the shutter 50 having a cut out 52 is shown in its "relaxed" condition. In this position, the cut outs 52 are not aligned with the row of terminal studs 41, 42, 43 and 44 and therefore the central forked conductors 92 and 93 are mechanically blocked from engaging the studs 42 and 43.

The shutter 50 is shaped and positioned such that when a battery 76 is installed in the detector module 70, as is shown in Figure 4, the battery 76 will displace it as the detector module 70 is inserted up into the socket 20. The upper part of the battery 76 engages the shutter 50 before the top of the forked conductor 92 reach the cut out area 52. The cut out area 52 is in the position shown in Figure 11 by the time the forked conductor 92 are about to pass through towards the terminal stud 42.

It can be seen that electrical connection between the detector module 70 and the ceiling mountable socket 20 is made via linear connection rather than by a plug in terminal or a rotating connection as is commonly used in other smoke detector systems.

The printed circuit board 80 housed within the detector module 70 is shown in Figures 6, 7, 8 and 9. Referring to Figure 8, a sensor 82 is shown. In this embodiment of the invention the sensor 82 is a smoke sensor. However, in other applications, a carbon monoxide or other type of detector may be fitted. A horn 84 is provided to produce a loud warning signal. Conventional red and green LEDs 85 and 86 are

provided together with light pipes 105 and 106 (light pipes shown in Figures 4 and 6).

Figure 9 shows how the battery 76 simply engages battery contacts 81. The terminals 31, 32, 33 and 34, although shown in Figure 9 for clarity of illustration, are in fact located within the ceiling mountable socket 20. Thus Figure 9 shows how the terminal 31, 32, 33 and 34 engage with the contact tabs 91, 92, 93 and 94 when the detector module 70 is installed with a battery 76 within the ceiling mountable socket 20.

It can be seen that the abovedescribed detector assembly 10 provides a compact low profile smoke detector that is easy to install by an electrical contractor.

While the present invention has been described in terms of a preferred embodiment in order to facilitate better understanding of the invention, it should be appreciated that various modifications can be made without departing from the principals of the invention. Therefore, the invention should be understood to include all such modifications within its scope.

DATED this 18th day of December, 2002.

GERARD INDUSTRIES PTY LTD

By its Patent Attorneys

MADDERNS



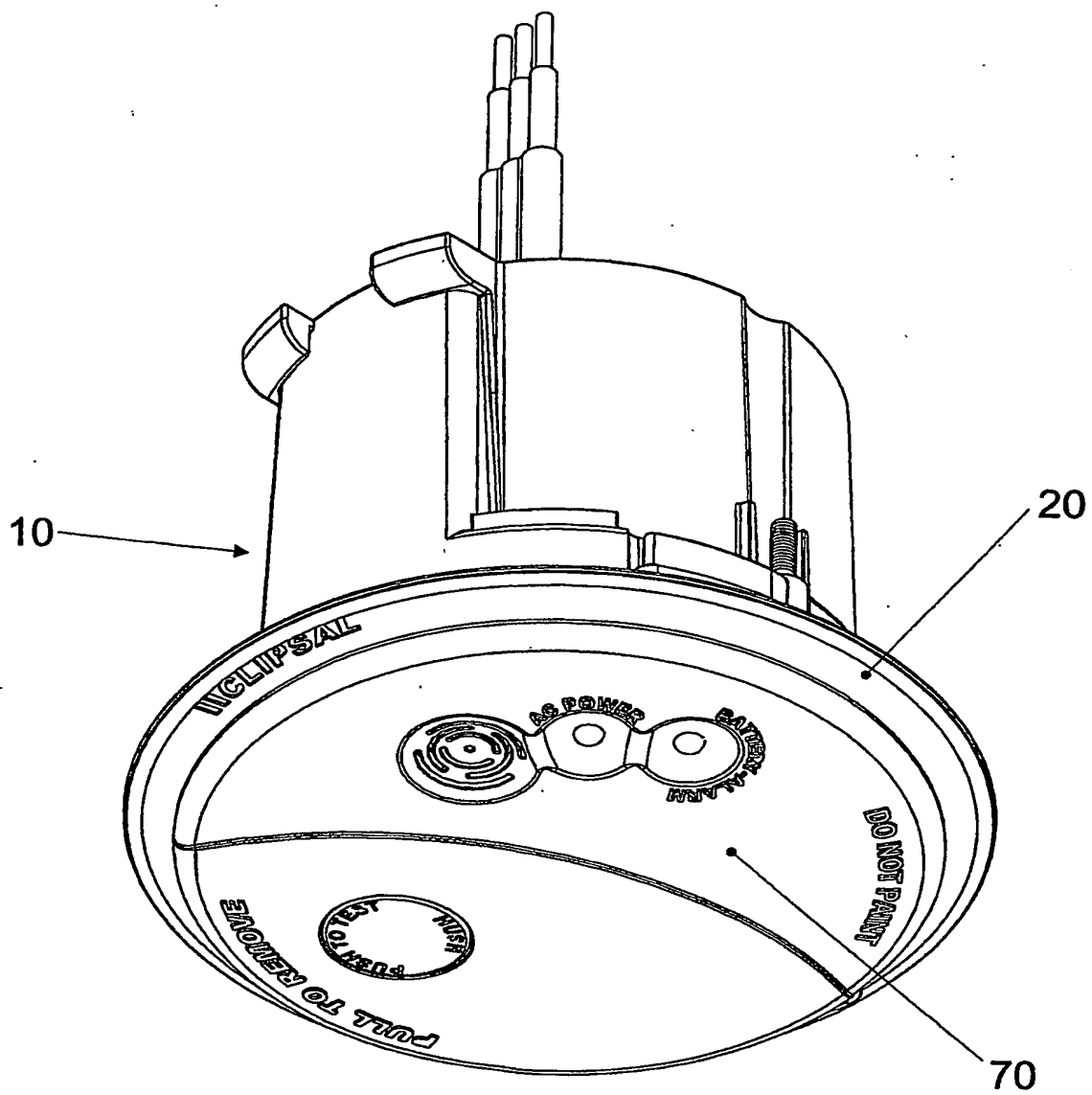


Fig 1

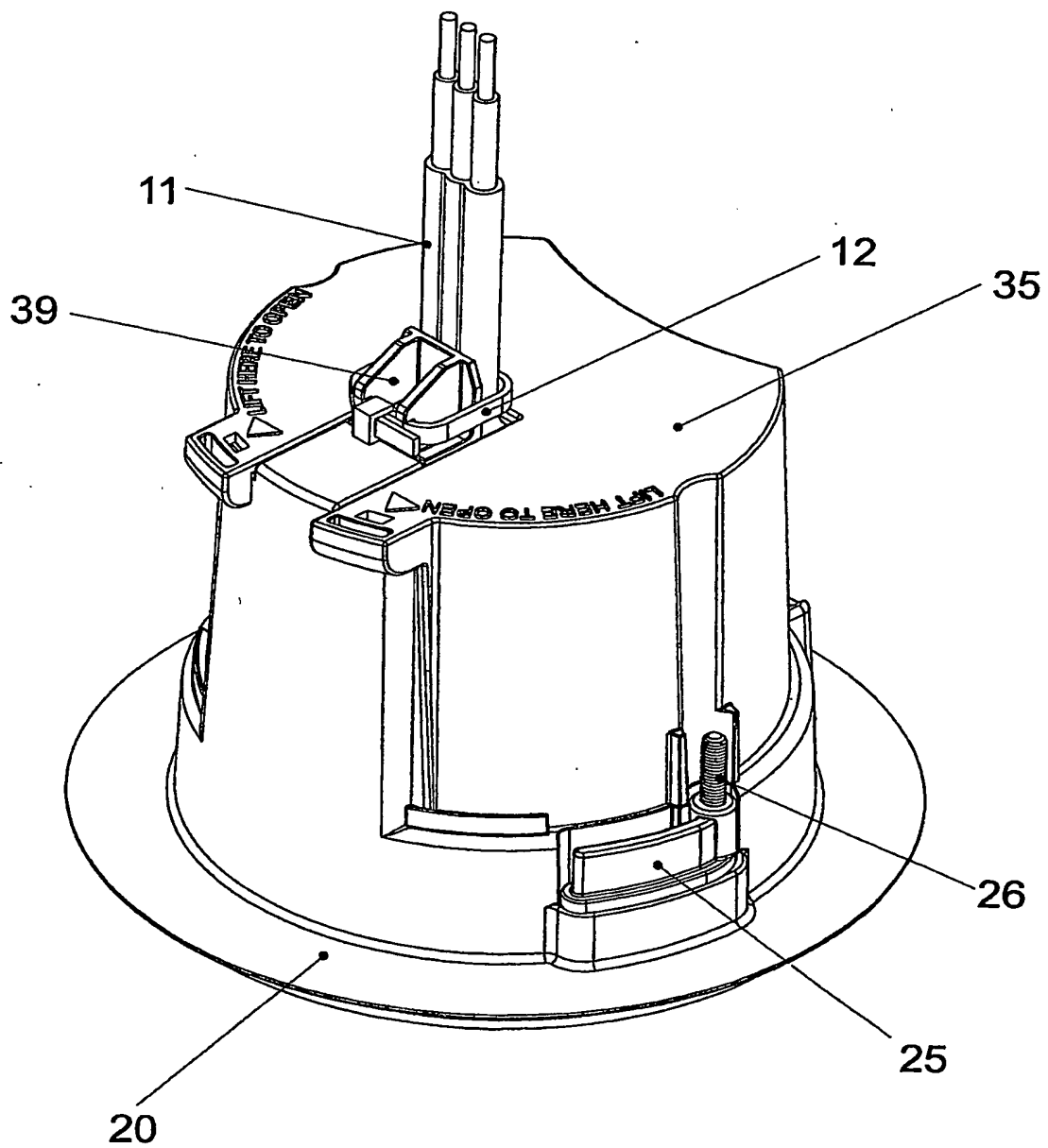


Fig 2

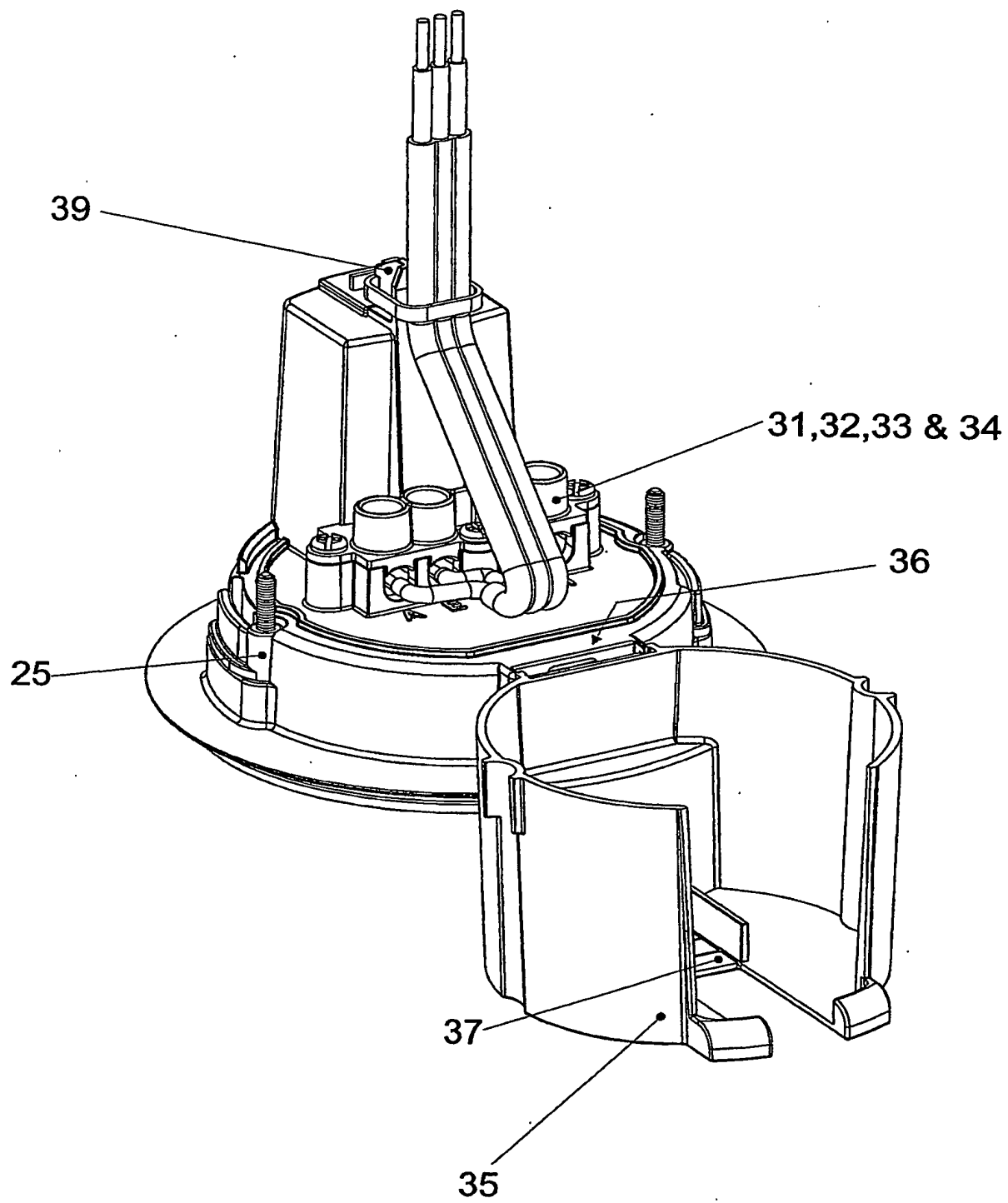


Fig 3

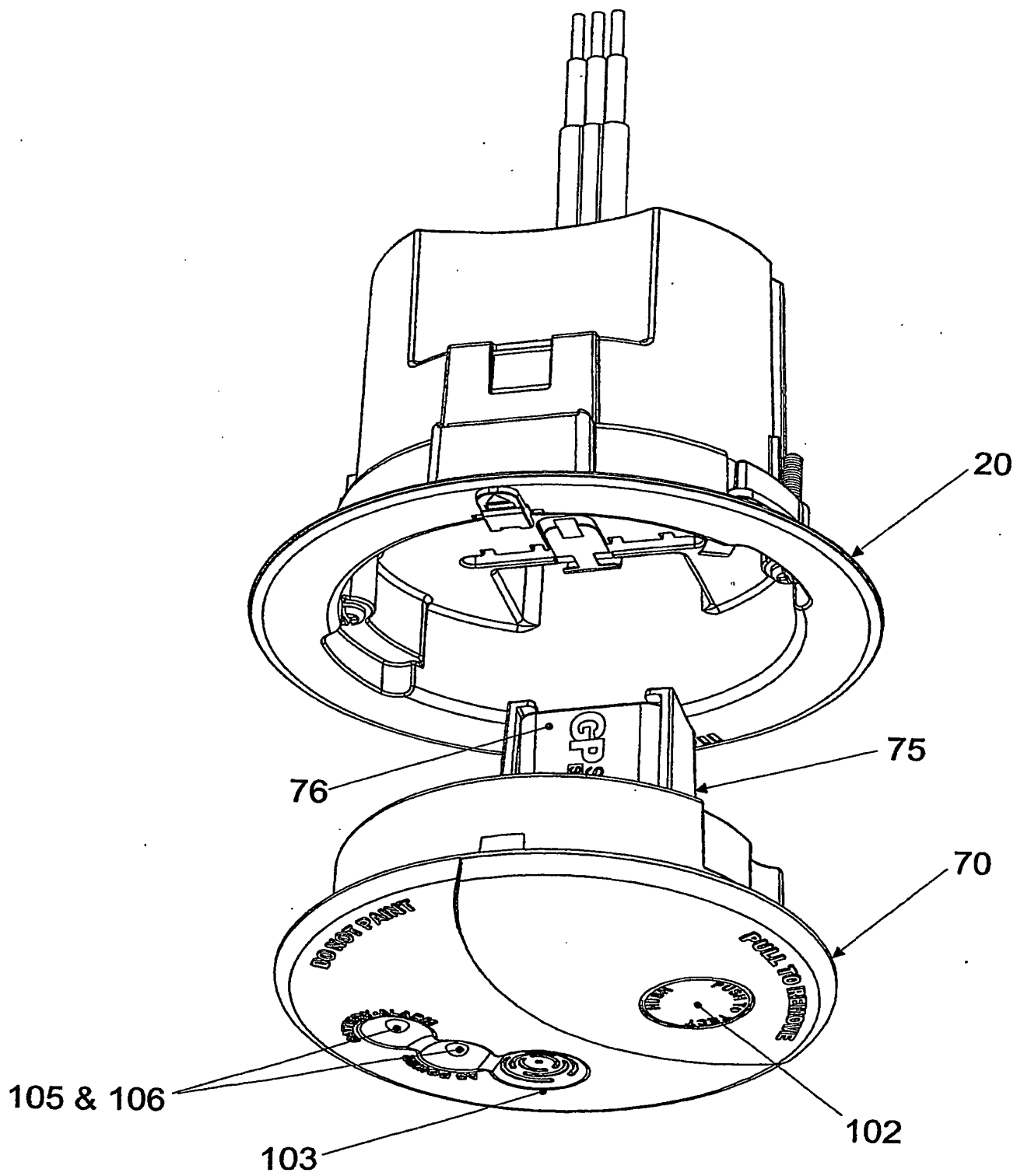


Fig 4

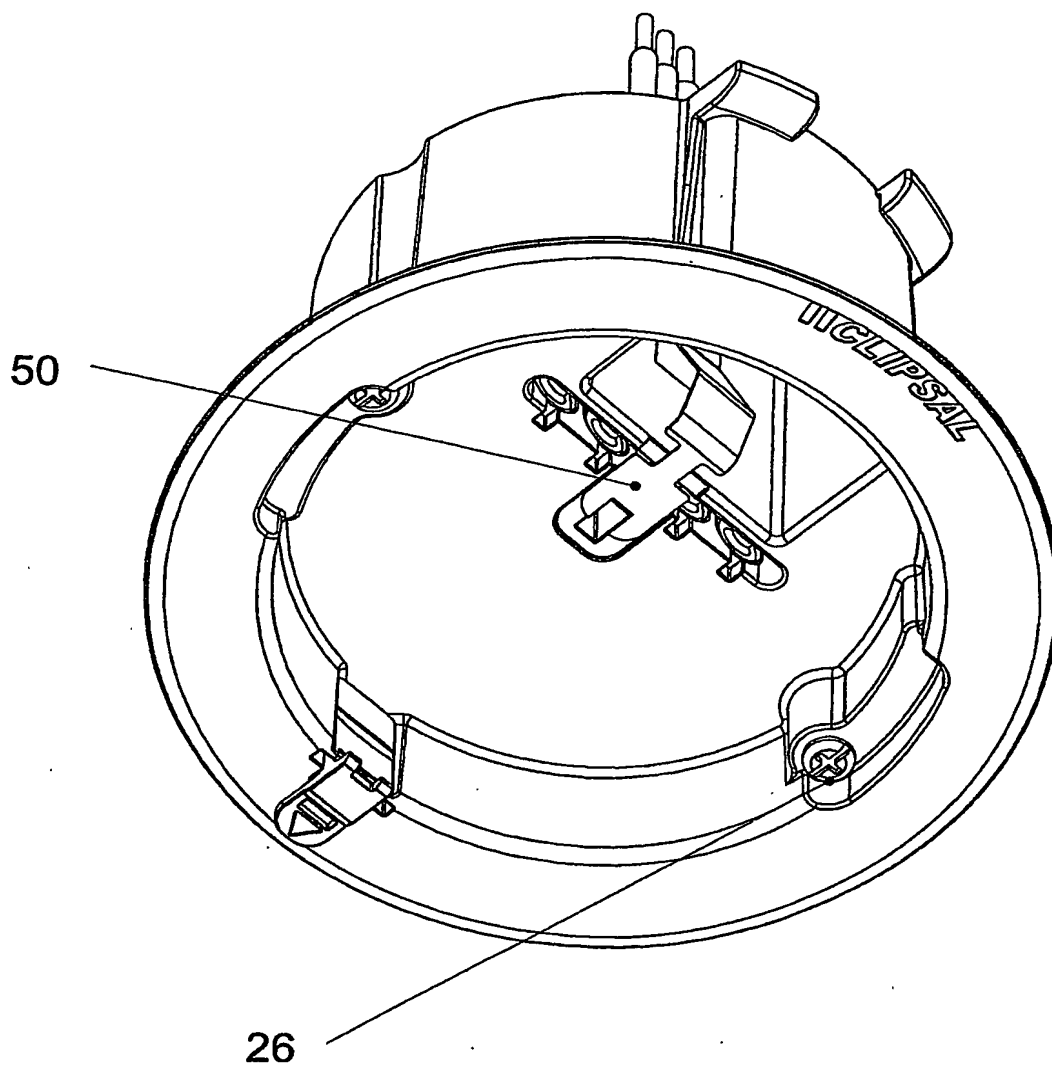


Fig 5

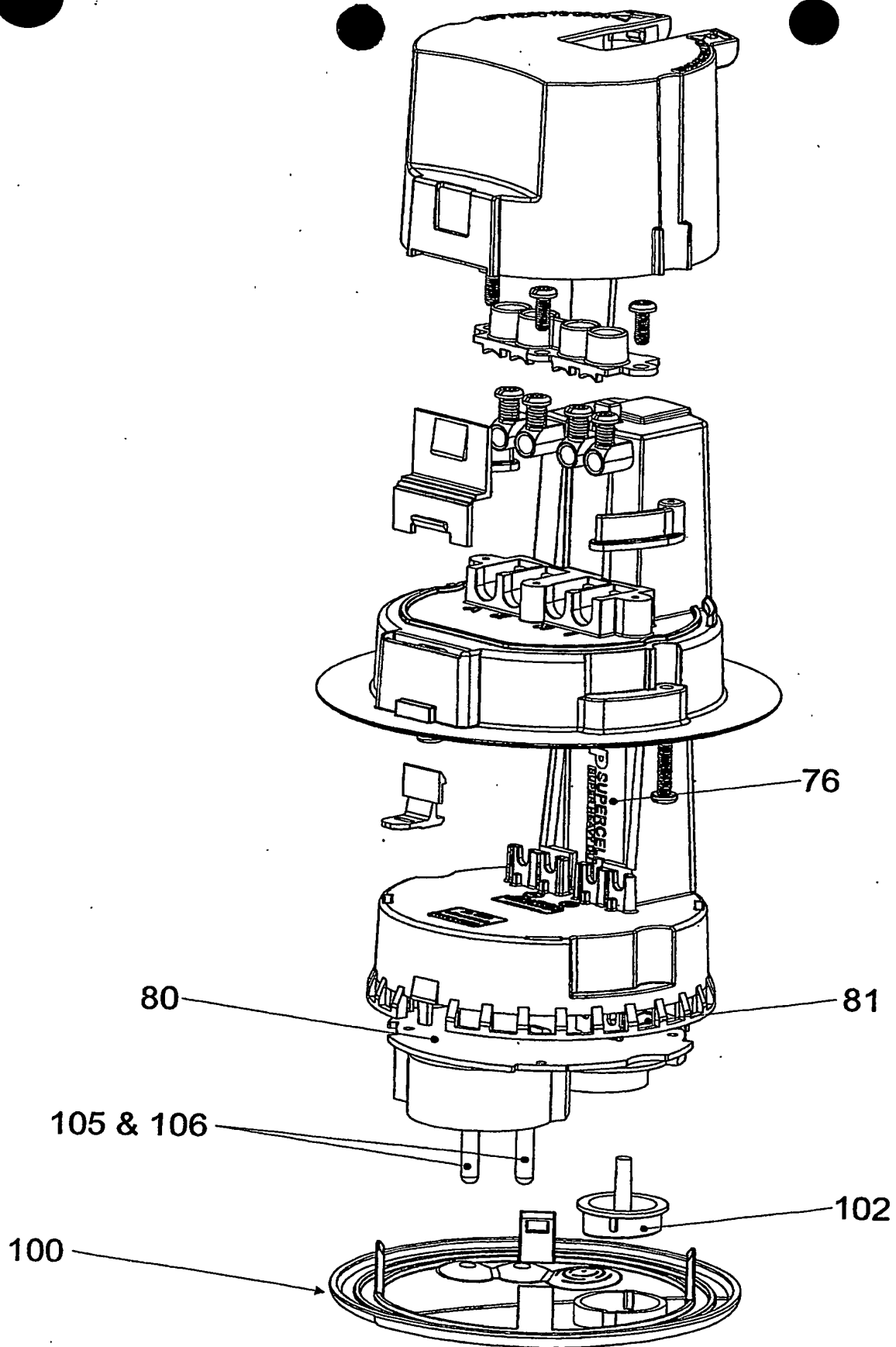


Fig 6

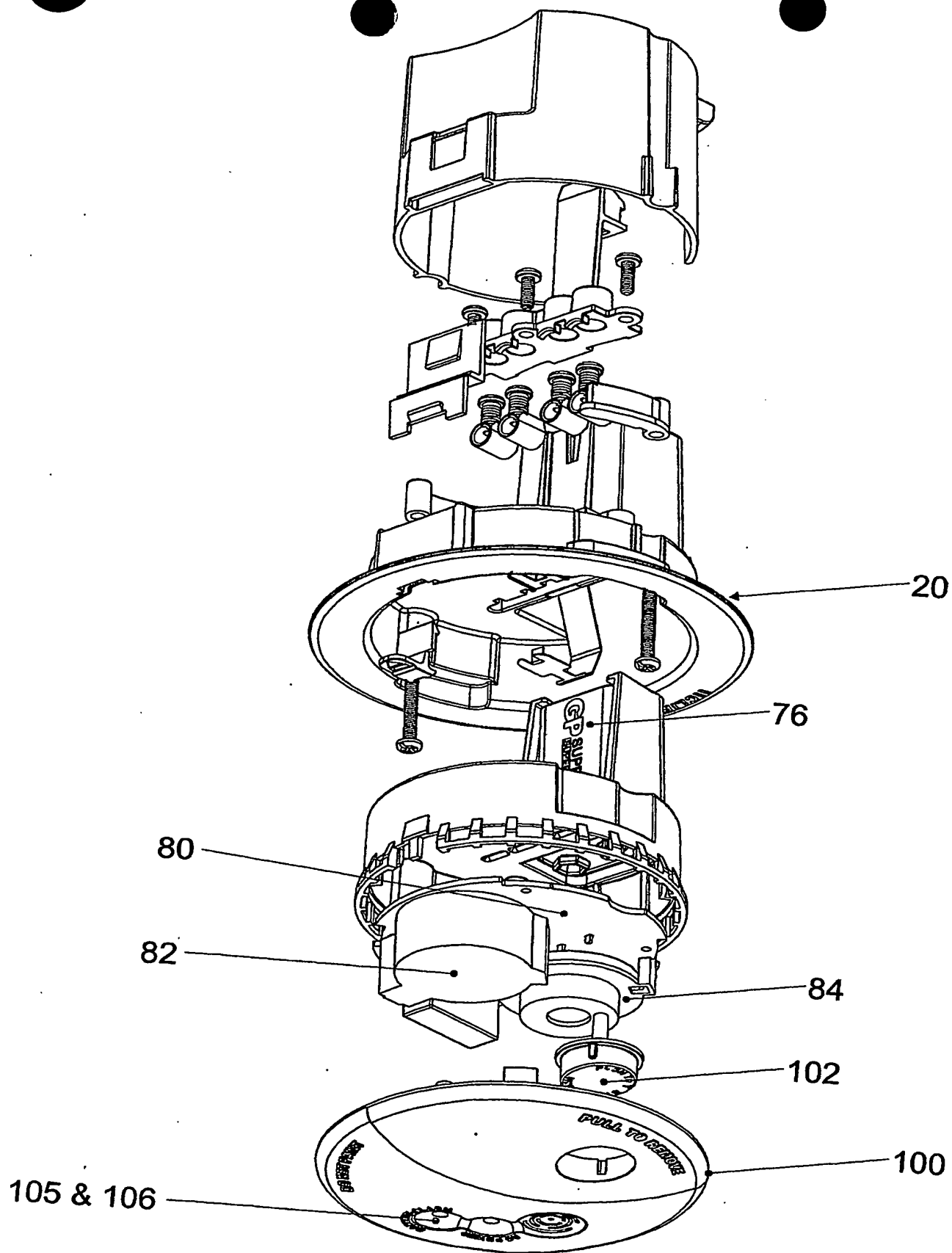


Fig 7

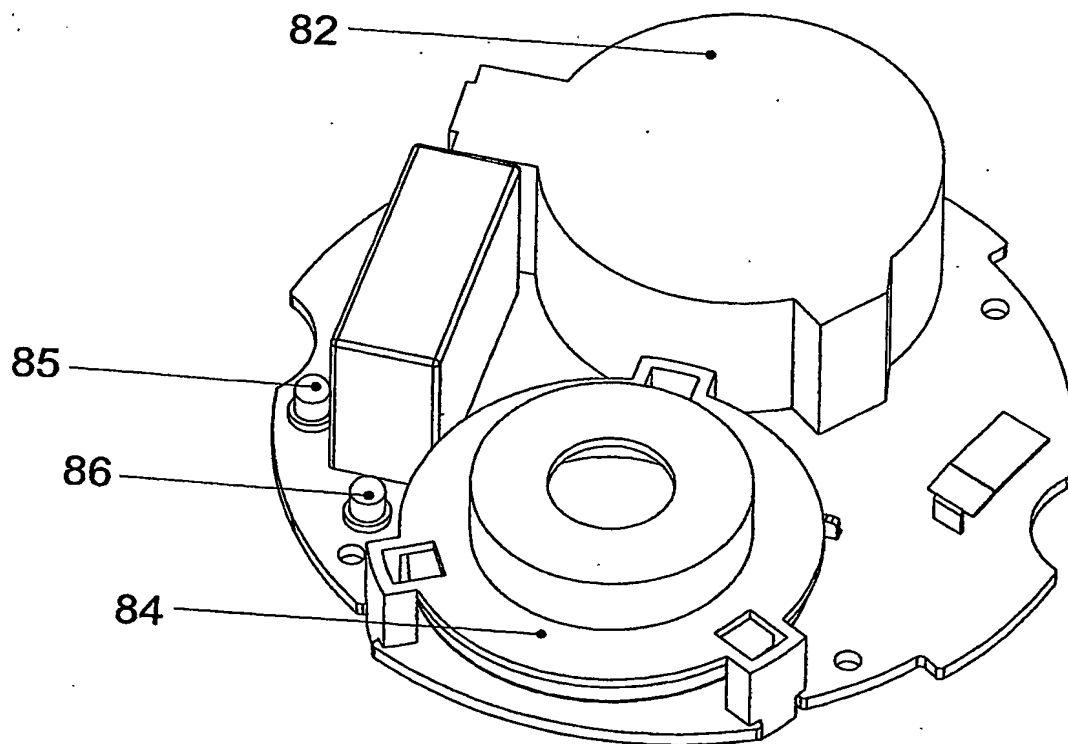


Fig 8

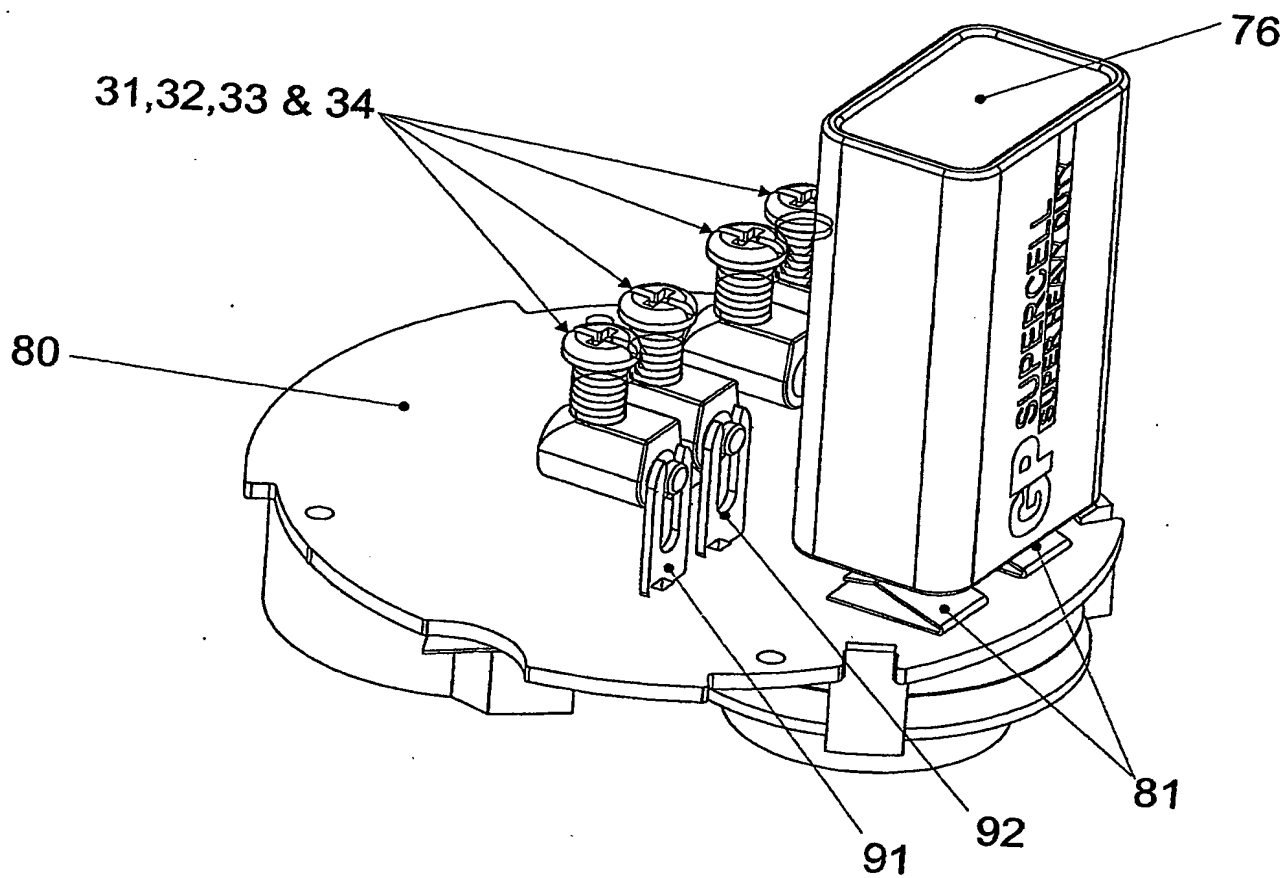


Fig 9

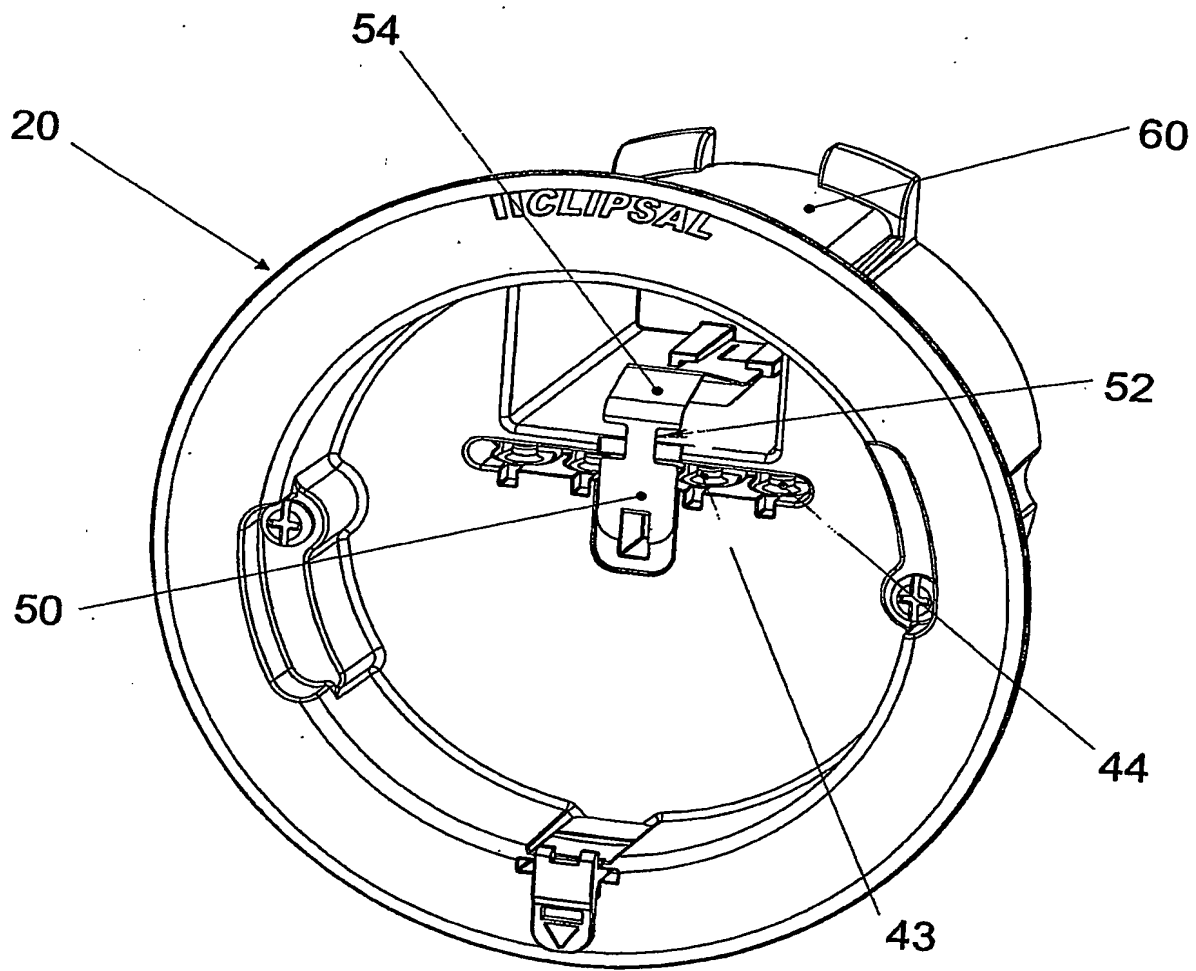


Fig 10

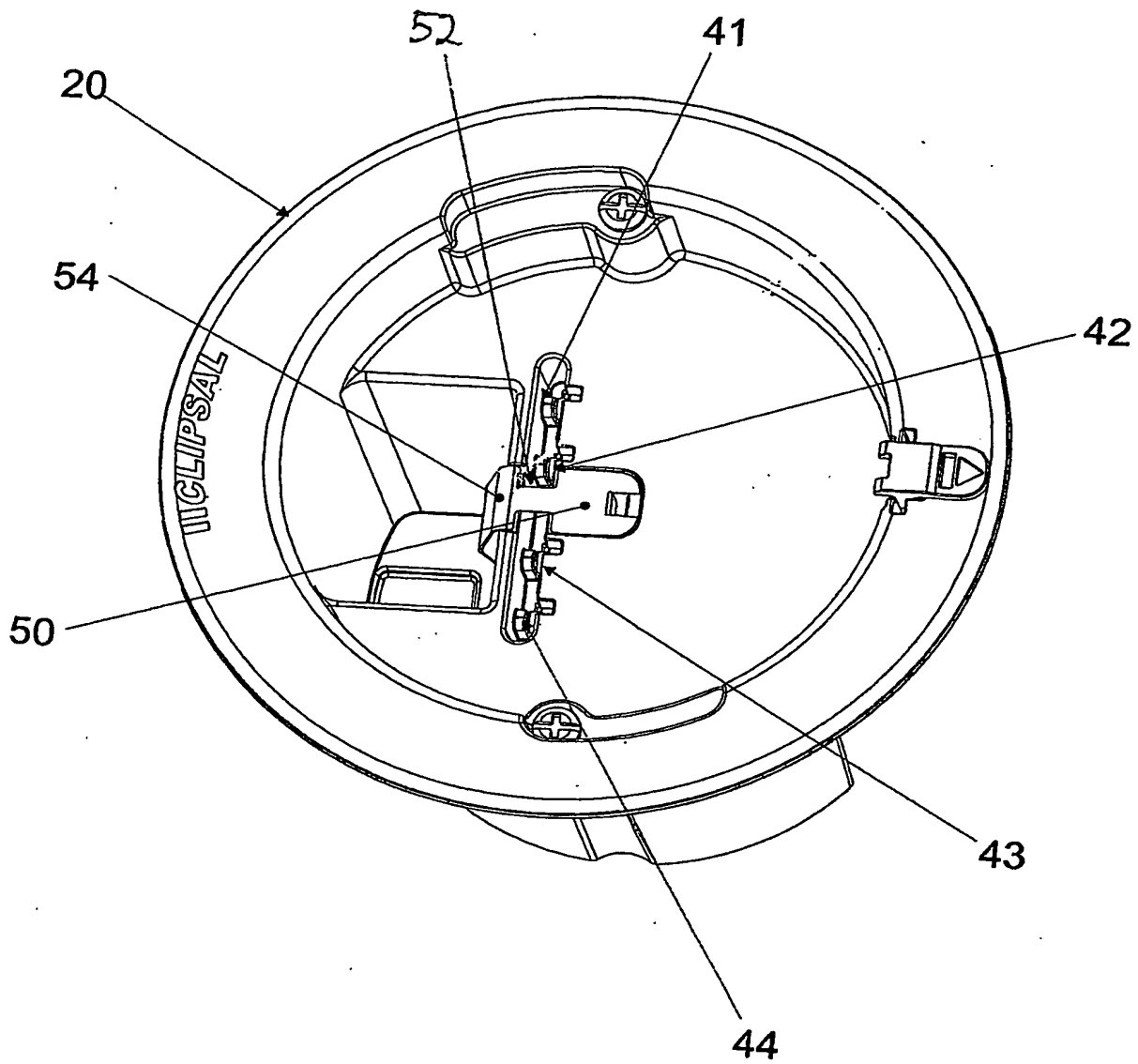


Fig 11

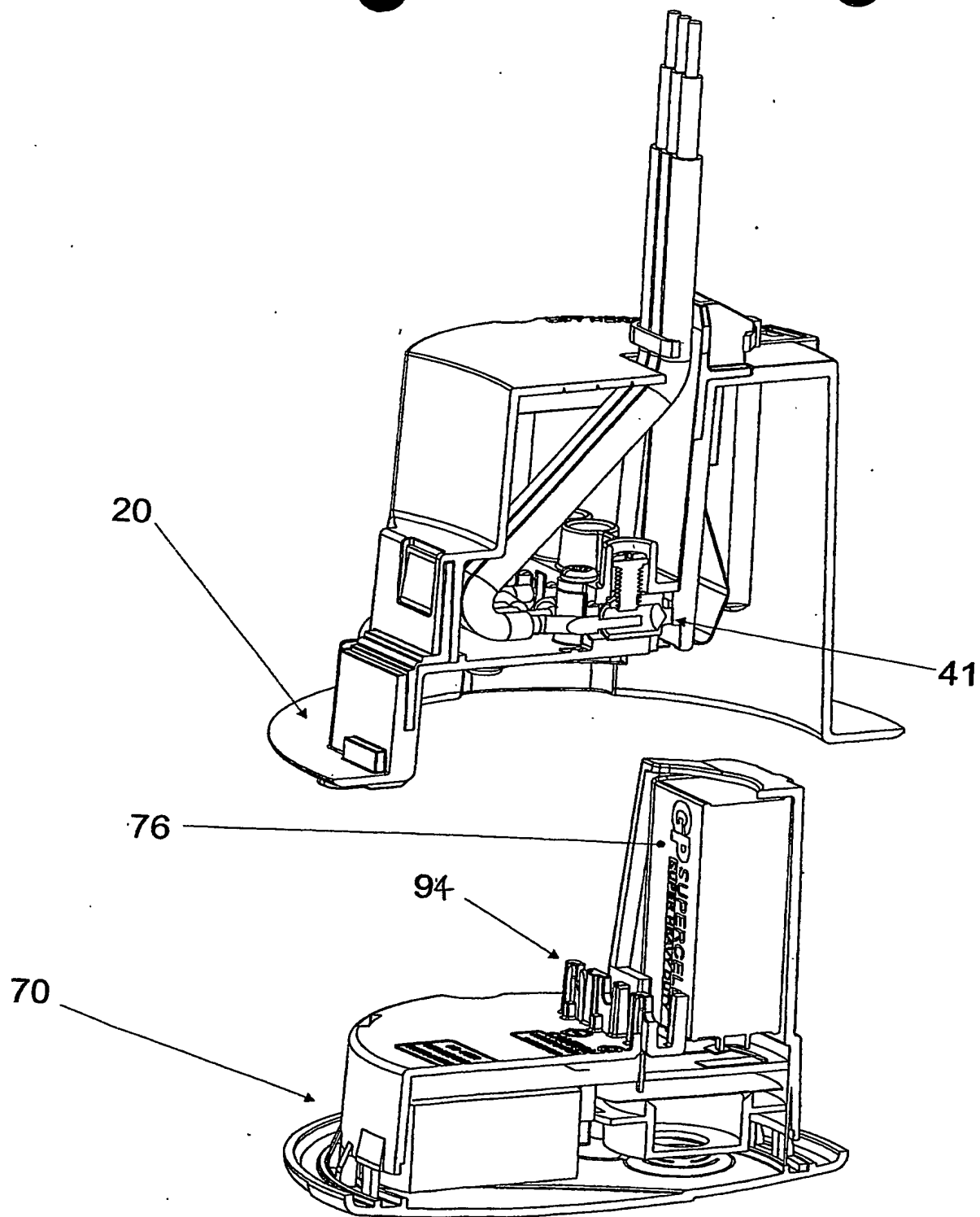


Fig 12

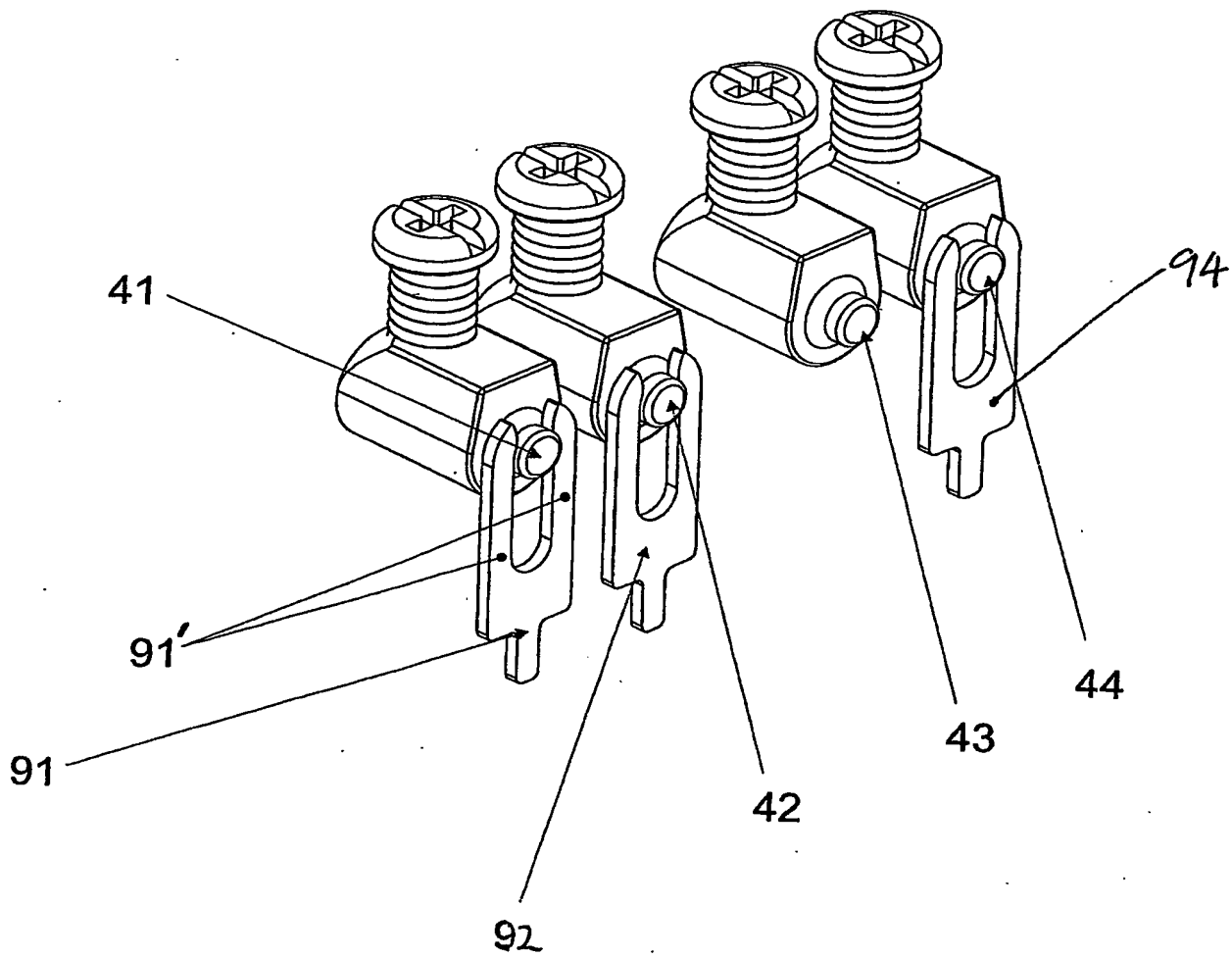


Fig 13

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